Operating System

General User-Productivity Enhancements

White Paper

Abstract

Operating systems that are easy to use are more cost effective. Improvements introduced with the Microsoft® Windows® 2000 Professional operating system make it the easiest-to-use Windows. This paper discusses in detail how the enhanced features in Windows 2000 Professional can help every user take full advantage of the operating system's capabilities.

This document is based on features in the Beta 3 version of Windows 2000 Professional, released in April 1999. Readers should be aware that features in the final released version of Windows 2000 Professional may vary from those in beta versions of the product.

CONTENTS

INTRODUCTION

During the past decade, the dramatic improvements in the technology and prices of desktop computers and operating systems have changed the business world. Technological enhancements and increased networking capabilities link departments and data and facilitate communication across physical and organizational boundaries. Today, most office workers use desktop computers to do at least part, if not most, of their work.

As desktop computers and operating systems have become more powerful, they have also become more complex. While some computer users take advantage of new features, many users do not. This can diminish a company's return on its investment in computers. When a user does not fully tap the potential of a new computer, the company may not be able to justify the computer's cost with a resulting increase in productivity. In some cases, the increased complexity can increase a company's support and training costs.

This paper discusses how improvements to the Microsoft® Windows® 2000 Professional operating system make it an easy-to-use operating system that helps every user take full advantage of its capabilities.

Making an Easier-to-Use Windows

Because it is the one type of software that all desktop-computer users must use, the desktop operating system is often the key to a computer's complexity and associated costs. In designing Windows 2000 Professional, Microsoft first researched how different types of users interact with the operating system. The goal of the research was to gather information about how users take advantage of the functionality and power of the desktop computer as a business tool.

After studying the results and carefully examining customer feedback, Microsoft made many changes to the Windows operating system. The result is Windows 2000 Professional, a business desktop operating system that was specifically created to help make users more productive and reduce total cost of ownership. Specific improvements include the following, which are detailed in this paper:

- **Easier installation**. Windows 2000 Professional includes a simplified, more reliable Setup program. It also supports installation scripts that require minimal user input.
- **A more customizable and powerful Windows desktop**. Windows 2000 Professional provides the user with more options for customizing the desktop, and it integrates automation that adapts to the way that a user interacts with the system.
- **Improved access to documents and resources**. Windows 2000 Professional stores all user files in a central location, the My Documents folder, in order to make it easier for the user to find and back up information on their own computer. Windows 2000 Professional also has a better search function, and because it supports network-based documents, Windows 2000 Professional makes it easy for a user to find documents and resources they need that aren't stored on their own computer.

- **Improved reliability and support for configuration changes**. Windows 2000 Professional supports self-repairing applications, Plug and Play, and power management, all of which allow the user to install hardware and applications without compromising the system or incurring significant downtime.

GETTING STARTED

The first time a user starts Windows 2000 Professional, they experience many of the operating system's enhancements. Installing Windows 2000 Professional is significantly easier--administrators can fully script the installation process, so users need not answer any questions other than user name and password. Even non-scripted installations are simpler and more reliable. In addition, Windows 2000 Professional supports creating small networks right out of the box.

Installation

The installation process can be one of the most challenging aspects of using a new operating system. In companies that provide administrators, installation is easier for users. The administrator often creates an installation script, which is a file that answers key questions associated with running the operating system for the first time. But technical limitations in scripting tools can make it very difficult for administrators to create scripts that can answer every question. Also, if something happens during setup that is not predicted and covered by the script, the installation will often stop, and the user often ends up calling the helpdesk. Many companies also use electronic software distribution tools, such as Microsoft System Management Server. While these types of products can make installation easier for users, there are still technical limitations that do not make these products appropriate in every situation.

One of the major design enhancements in Windows 2000 Professional is that it is significantly easier for users to set up. Following are examples of what Windows 2000 Professional does during a non-scripted installation:

- **Simplifies the setup process**. The screens and questions presented during the setup process are in plain, non-technical language. For example, one setup screen asks, "Who is using this computer?" Based on the answer, the operating system automatically configures the appropriate security level of the user.
- **Automates more tasks**. Whereas setup programs in previous versions of the Microsoft® Windows NT® operating system assumed that users knew how to set up a computer and thus could answer every question, Windows 2000 Professional makes more assumptions about how computers should be set up. For example, the person setting up the computer is automatically made a user on that computer's operating system, rather than having to go back and use a separate tool to do so once the installation is complete. Windows 2000 Professional also provides hardware detection and supports Plug and Play, which automates installation and configuration of hardware devices.
- **Makes the installation process more reliable**. In previous versions of Windows NT setup stopped an installation as soon as it encountered a problem, regardless of whether that problem was critical to the system, Windows 2000 Professional tracks issues during installation. If a problem arises that is non-critical--meaning that it won't keep the computer from starting--the installation continues. Once installation is complete, the operating system generates a report log of problems for an administrator to address.

The improvements that have been made to the Windows 2000 Professional installation process are the most dramatic in environments where administrators use installation scripts for electronic software distribution tools. For example, by using Setup Manager, a tool now available to administrators, nearly every aspect of an installation can be automated-- once a user turns on the computer and enters their user name and password, the system automatically configures itself with all the proper settings. Setup Manager is a graphical tool that makes it easier for administrators to create scripts. With Setup Manager administrators can also automate common tasks, such as joining systems to the corporate network. The tool also includes a mechanism for including newer components or devices drivers that did not ship with Windows 2000 Professional.

Logging On

Using CTR + ALT + DEL before logging on is the safest way for a user to log on to Windows 2000 Professional; it helps to protect the operating system from unauthorized access.

In order to log on, all Windows 2000 Professional users are first presented with a streamlined logon screen that hides the domain names. Users infrequently need to change their domain; therefore, hiding this option can reduce helpdesk costs by reducing the possibility of users' inadvertently changing the domain.

In certain Windows 2000 environments, users can log on even faster. For example, Windows 2000 Server supports Kerberos, an additional method of authenticating users. Kerberos is an industry standard authentication protocol.

Setting up Small Networks

Many business users need to create small networks in order to share printers and exchange files. Windows 2000 Professional makes it possible to configure small networks right out of the box--simply plug the Windows 2000 Professional configured computers into a hub device. The first time Windows 2000 Professional starts, it is set to a default that looks for a DHCP (Dynamic Host Configuration Protocol) server. This type of server assigns addresses to computers in order to make it easy for all the computers on the network to find each other. If a DHCP server is not part of the network, which is usually the case with many small and home-based businesses, Windows 2000 Professional then automatically broadcasts itself in a mode that is capable of finding other Windows 2000 Professional-based computers connected to that hub. New Windows 2000 Professional-based computers that are added to the hub will automatically join the workgroup. This capability is often called Automatic IP addressing. For more information about this feature of Windows 2000 Professional, see the Windows 2000 Professional Technical Overview.

ENHANCED WINDOWS DESKTOP

As computers become more useful, they often become more complex. In fact, in the last few years, the typical user's computer desktop--the essential workspace for many employees--has become increasingly cluttered. Similarly, as computers have become capable of doing more tasks, it has also become more difficult for many users to "discover" how to accomplish certain tasks. Most users are not willing to refer to a manual or invest a significant amount of time in learning new tasks.
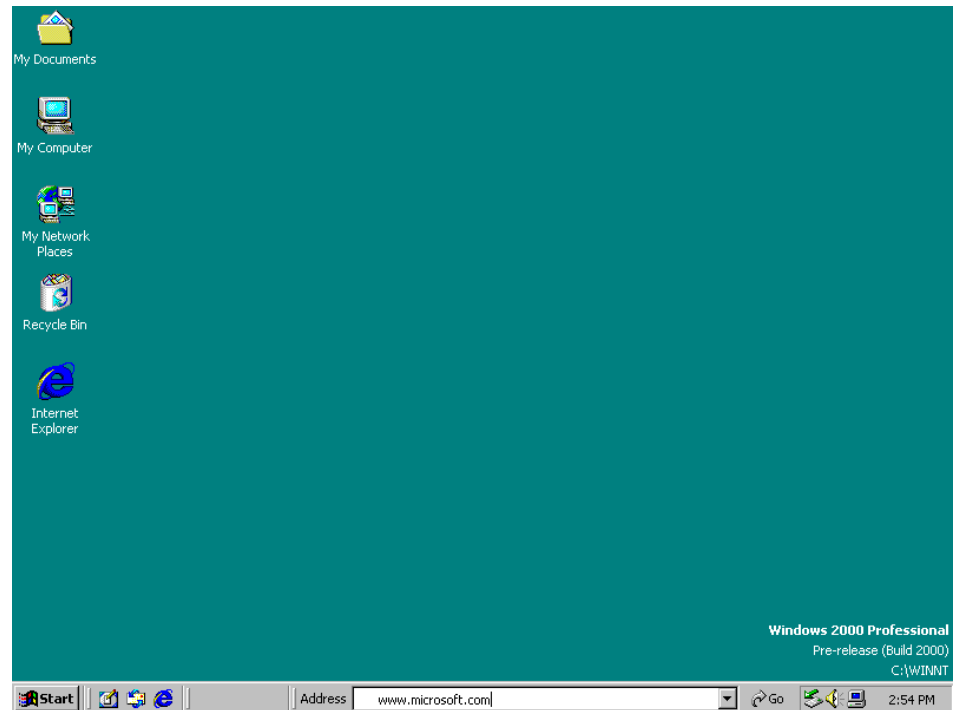

Figure 1. The Windows 2000 Professional desktop is less cluttered and easier to personalize.

Windows 2000 Professional introduces many refinements to the desktop area that help users work more efficiently. It provides users with more options for customizing the desktop and integrates automation that adapts to the way that a user interacts with the operating system. For example, Personalized Menus reduces desktop clutter by dynamically adapting the Start menu to provide the user with immediate access to the computer resources they use most often. Using the Most Recently Used lists extensively gives the user even faster access to the resources they frequently use. AutoComplete has also been enhanced--it is now part of nearly every dialog that requires the user to type information.

Personalizing the Desktop

Although the Windows 2000 Professional desktop looks similar to previous Windows operating-system desktops, it is less cluttered and easier to personalize. The Windows 2000 Professional user can set more preferences to adapt their computer to their needs, and the operating system itself is more capable of "learning" the habits of a specific user in order to help them complete tasks faster.

Personalized Menus

The average user installs many dozens of applications over the life span of a computer. The result is often a cluttered Start menu that lists dozens of entries, some of which may be used every day but most of which are used only occasionally.
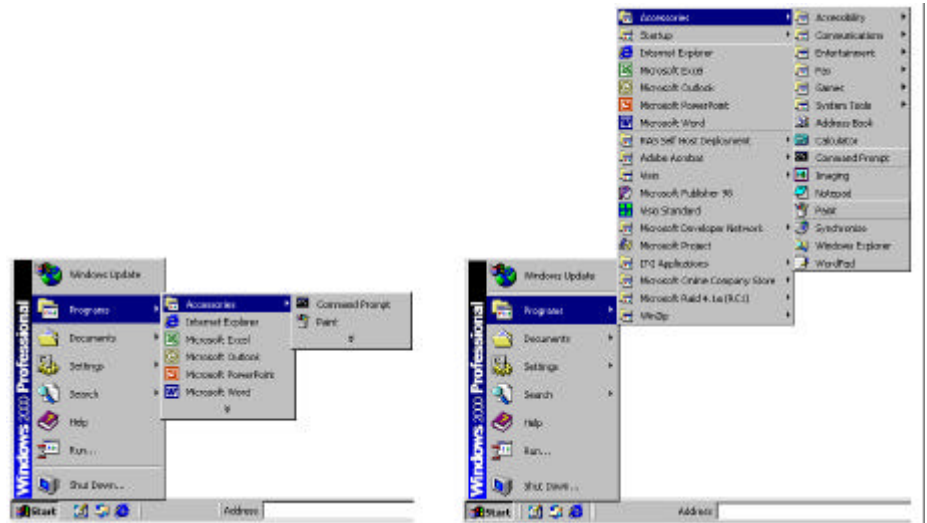

Figure 2. Personalized Menus highlight only the most frequently used items. To display other menu items, hover over the double arrows.

The Personalized Menus feature of Windows 2000 Professional continually monitors and highlights only the most frequently used menu items. To display other menu items, the user hovers over the double arrows. The result is a much less cluttered desktop that gives users quick access to their most frequently used programs. The highlighted menu items change dynamically, so if a user begins using an application more frequently, it is promoted to the top line.

Most Recently Used Lists

Most users personalize their desktops to make frequently used resources easy to find. For example, a user can set up a permanent connection to shared network folders where their work group saves important shared documents, such as marketing plans or product specifications.

However, users often lose productive looking for resources they only use occasionally. For example, in order to find a presentation template that is normally only used by another group in the company, a user has to find that group's shared network folder, generally by contacting someone in the group that normally uses the template. Once they find it the user probably does not create a permanent connection to that folder; they don't expect to need it again. If the same user needs another template from the other group's folder several weeks later, it's likely that they will follow the same process again.

The Most Frequently Used lists in Windows 2000 Professional make this type of task much easier. As the name implies, Windows 2000 Professional tracks where the user has been and keeps a list of these resources in the appropriate place. For example, the enhanced My Network Places folder keeps a list of network places accessed even if a user does not make a permanent connection. Most Frequently Used lists are kept in many places throughout the Windows 2000 Professional interface, including in Search and in the Open/Save dialog.
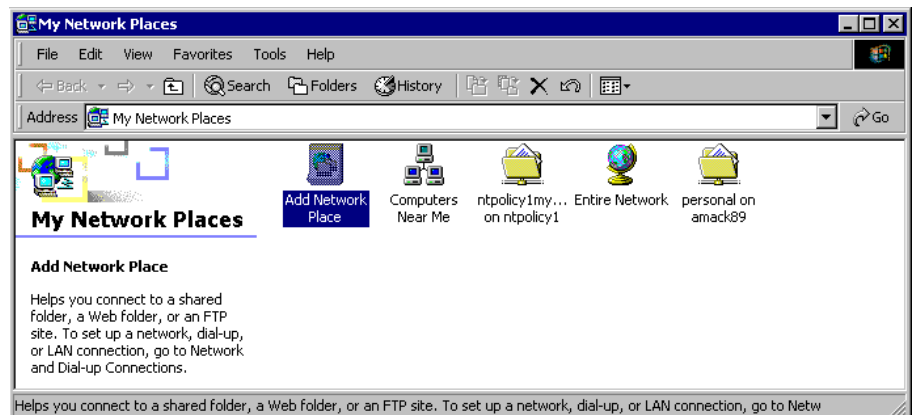

Figure 3. My Network Places tracks the folders and resources that the user has visited throughout the network.

AutoComplete

In order to conduct an ordinary task such as saving a file or entering a Web uniform resource locator (URL), a user has to type information. It's easy to make a mistake, and it's hard to remember long lists of file names or lengthy addresses. The AutoComplete component has helped Windows users with their ordinary typing tasks since it was introduced with Internet Explorer 4. AutoComplete helps users complete long, complex URLs (for example, type www.micr and AutoComplete will finish with www.microsoft.com). Generally, AutoComplete only completes addresses for places that a user has already visited. For example, if a user needs to look at another group's marketing plan that they looked at several weeks ago, and they can remember the name of the group's network share but not the exact folder name, AutoComplete can find the folder.

Windows 2000 Professional significantly enhances the AutoComplete feature and expands its use throughout the desktop, not just for typing URLs. First, when AutoComplete recognizes a match, rather than typing over an entry, it presents a list of options. The user selects the correct option.

Second, AutoComplete can search ahead to provide the user with a list of possibilities. For example, if a user types "\\wpg\u," AutoComplete provides a list of all the entries within the folder that begin with the letter "u." By doing this, AutoComplete helps users find resources they would normally not be able to find unless they could type the precise path.

Windows 2000 Professional makes use of AutoComplete throughout the operating

system, including dialog boxes, Run, Forms, Mapping Network Drives, and Windows Explorer.

Start Menu Options

Windows 2000 Professional gives users many more ways to customize the Start menu, including the choice of whether to display folders such as Favorites and My Documents, and whether to cascade entries such as Network Connections and Printers.

Other Key Desktop Enhancements

Windows 2000 Professional includes many other desktop enhancements; among them are:

- **Balloon Help.** To help users more easily discover many of the usability enhancements in Windows 2000 Professional, Balloon Help improves upon Tooltips, the word descriptions that appear when a user hovers the cursor over an icon. For example, the first time Personalized Menus appear, a Balloon Help dialog tells the user what to expect.
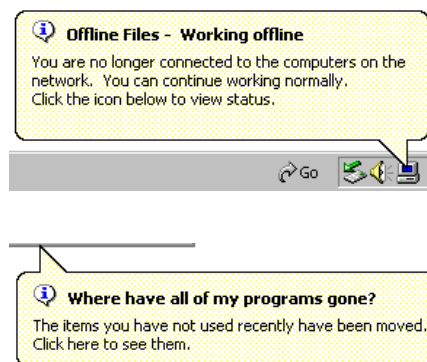

Figure 4. Balloon Help dialogs help users discover many of the enhancements in Windows 2000 Professional.

- **Customizable Toolbars**. The Windows Explorer toolbar can be customized in different ways. For example, a company can create customized buttons for employees' specific tasks, such as to access the corporate Intranet site.
- **Simplified My Computer Folder**. The My Computer folder has been reorganized--it now lists only the storage devices on the user's computer and on the Control Panel. For example, Dial-Up Networking and Scheduled Tasks are now on the Control Panel, a more appropriate place for these items, since they are tools that perform control functions.
- **Enhanced My Network Places Folder**. My Network Neighborhood has been renamed and enhanced to provide a view of all the shared computers, files and folders, printers, and other resources on the network or networks that a computer connects to.

- **More Thorough Help**. The Help function in Windows 2000 Professional has been enhanced and expanded to include the following: more consistent style, organization, and terminology; a streamlined Contents tab; fewer levels; a larger, more thorough index; better integrated Troubleshooters; more of an emphasis on commonly used tasks; more shortcuts available to start components from within Help; and extensive uses of Related Topics links.
- **System Messages**. Whenever possible, error messages give Windows 2000 Professional users specific actions to take to correct problems, rather than just telling them that something went wrong. Messages also list related tools and Help topics that can help the user avoid making the error again. In many cases, error messages that require user interaction and impact the operating system's stability are distinguished from informational messages. Informational messages that don't impact the stability of the system automatically time out.

WORKING WITH DOCUMENTS AND FILES

Windows 2000 Professional makes it easier for users to work with documents and files. The My Documents folder has been revised to be the central storage space for user files, making it easier for users to find information and easier for administrators to redirect important user data to a network location for backup. The Search function has also been significantly enhanced; it's easier to conduct general searches for documents, resources, printers, people, and information on the Internet. Working with attachments has been enhanced, too--users no longer need to guess how to access a document that's attached to an e-mail message. Finally, Windows 2000 Professional users can work with network-based documents, even if the network is not working properly--the operating system can be configured to automatically synchronize resources when the network comes back online.

My Documents Folder

Users often have trouble finding saved files because applications don't save files to a consistent location. For example, some applications save files into folders that the applications create automatically; other applications do not specify where files should be saved, so they default to the system32 directory. Saving to the system32 directory can be dangerous since this is where operating system files are stored; any change to one of the system files in the system32 directory may corrupt the system. This lack of consistency was hard for administrators as well as users since they couldn't always find all the documents that they were supposed to back up to a secure network location.

The My Documents folder is significantly enhanced in Windows 2000 Professional. Users now have a consistent location for saving and finding information. Unless an application explicitly needs to save in a different folder, Windows 2000 Professional intercepts the Save path and redirects it to the My Documents folder. The administrative function of the My Documents folder has also been improved. Because the path to My Documents can be easily managed using Group Policies, administrators now have an easy way to redirect user data for storage in a network location. Finally, the contents of My Documents are stored on a per-user basis-- even if they share a computer, one user cannot view another user's documents.

My Pictures

Within the My Documents folder is a folder, My Pictures, that makes working with images easier. Using My Pictures, the user can view and work with image files without having to open an image-editing application. For example, the Image Preview feature displays a full-resolution representation of the image. The user can view the image either as a full-screen window or scaled to actual size, and they can also zoom in and out to see details. If the picture or image is stored on a drive that uses the NTFS file system, the user can also enter text descriptions of picture attributes, such as title, subject description, or category.

Finding Information and Resources

The exponential growth of networks increases the amount of information that business desktop-computer users can provide and locate every day, but the sheer volume of available information often makes it hard to find specific documents, folders, and resources. Windows 2000 Professional includes several enhancements that make it easier to find information easier.

General Searching

Windows 2000 Professional makes it easier and faster to locate files and folders locally, on the corporate network, on the corporate intranet, or on the Internet. A consistent, more powerful search button available on the Start menu, in My Computer, and in Windows NT Explorer makes it easier to search for information locally and on the Internet. Recently visited network places are easier to search, too (see "My Network Places" in the Enhanced Windows Desktop section of this paper). Search also contains AutoComplete functionality, which can help users find work items whose addresses or file names are difficult to remember.

In Windows 2000 platform environments (Windows 2000 Server and Windows 2000 Professional) with Active Directory® directory services, users can perform fast and powerful searches to find people, applications, or hardware resources throughout the organization. For example, Active Directory enables a feature called the Global Catalog, an optimized index of resources that an administrator has created for the user.

Windows 2000 Professional includes content-indexing capabilities, which creates keywords for each file to make it easier to find and sort through files.

Searching for Printers

In a Windows 2000 platform environment with Active Directory, Windows 2000 Professional users can search for printers that have the attributes they need, such as paper size, double-sided printing, resolution, and color. Users can also create custom printer properties.

Searching for Groups and People

In a Windows 2000 Server environment that uses Active Directory, Windows 2000 Professional users have expanded capability for finding different groups and people.

Searching the Internet

Windows 2000 Professional includes several capabilities that help users find information on the Internet.

The enhanced Search pane presents search options topically, rather than by search engine, such as Web sites, people, companies, or maps. Users and administrators can customize the search engines used for each of these topical searches, including adding custom search engines. If a users is not satisfied with the results of a search, they can redirect the same search to another search engine by clicking the **Next** button on the Search pane.

Users who type searches directly into the address bar (such as Microsoft, ? Microsoft, or Go Microsoft) receive, within a single page, the results of a typical Web search as well as a specific suggestion on a matching site, if one exists.

Working with Different File Types

Most users have to work with different file types, especially when they have to open e-mail attachments. Windows 2000 Professional includes enhancements that make working with different file types significantly easier:

- **Open With Option**. It's not unusual for a user to receive a file that they have no idea how to open; this happens most often with e-mail attachments. The enhanced Open With option in Windows 2000 Professional makes it easier for users to open unknown file types. Right-clicking a file opens the Open With menu, providing the user with a choice of all the registered applications on the operating system that might be able to open that particular file type. If the user wants to open the file with an application that isn't listed on the Open With menu, they can choose the Any Program item on the menu, which launches an enhanced Open With dialog box. This dialog box provides users with a list of the usable applications and their traditional associated icons to make it easy for users to identify what application to use. After a user opens a file with a particular application, the Open With menu displays that application as a choice in the menu.
- **Automatic Application installation**. In a Windows 2000 platform environment that uses Active Directory directory services, the Open With dialog is not necessary. For example, an administrator can configure Windows 2000 Professional to automatically install Microsoft Word 2000 when a user attempts to open a document created in Microsoft Word.

Working When the Network is Down

Some analysts have estimated that more than 50 percent of all businesses require their desktop-computer users to save their documents to a network location. While this common requirements makes it easier for administrators to back up user documents, there is a drawback to it--documents are not accessible when the network is not working properly.

Windows 2000 Professional has an feature called the Synchronization Manager that takes care of this problem for users and administrators alike. When a user right-clicks on a document or folder and then selects Make Available Offline, that document or folder is stored on the user's desktop computer as well as on the network server. Synchronization Manager allows the user to configure the system to synchronize items while the system is idle, when the user logs on or when the user logs off of the computer. Because only the changes are copied, these actions do not add significant traffic to the network. If the network goes down, the disconnection is transparent to the user. When the network comes back online, the user receives a message that instructs them to synchronize the files.

Other Key Enhancements

Here are more examples of enhancements to Windows 2000 Professional that make it easier to work with files and folders:

- **Open/Save dialog box.** The enhanced Open/Save dialog box in Windows 2000 Professional makes it easier for users to find documents. Its Outlook-style toolbar includes a list of the user's most frequently used documents and History. Open/Save has AutoComplete functionality, and it supports thumbnails.
- **Internet Printing**. Windows 2000 Professional users can print over the Internet. Using the standards-based Internet Printing Protocol (IPP), users with Internet connections can send documents to any Internet-connected printer in a Windows 2000 Server environment. This is a simple and attractive alternative to sending a fax, overnight mail, or e-mail attachments in order to print documents.

Enhancements to Windows 2000 Professional make it significantly easier for users to install and modify applications. The Add/Remove Program wizard provides users with more information about applications. Windows Installer technology makes it possible to install self-repairing applications. Support for Plug and Play, power management, and Universal Serial Bus (USB) make it significantly easier for users to work with hardware. Finally, an enhanced Control Panel organizes tools more logically.

Working with Applications

Windows 2000 Professional includes an enhanced, more informative Add/Remove Programs (ARP) dialog. The dialog provides the user with more information about applications, such as disk space used, version, frequency of use, and whether online technical support is available. For some applications the support dialog box also contains a Repair option that will reinstall the application to improve problems with functionality.[1] For companies that use an electronic software distribution product, such as Microsoft's System Management Server, the Add Programs dialog is automatically updated with applications that are available to the user, eliminating the need for the user to manually search for application installation shares.
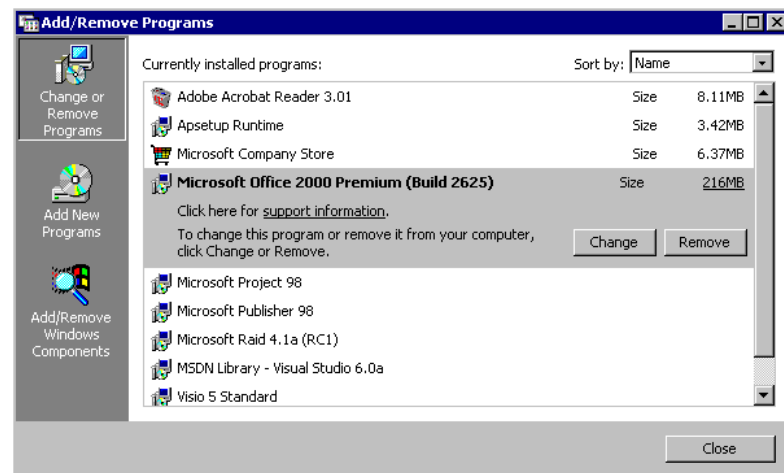

Figure 5. The Open With menu provides a choice of all the registered applications on the operating system that might be able to open that particular type of file.

In a Windows 2000 platform environment with Active Directory directory services, the Add Program dialog is automatically updated with applications that users can install based on policies set by an administrator. For example, if a company's administrator publishes access to Visio, the company's Windows 2000 Professional users have the option to install Visio or, if they receive a Visio attachment, the

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[1] Available only for applications that use Windows Installer technology. To repair the application users must have access to the original installation media, such as a network share. For users in a Windows 2000 platform environment with Active Directory directory services, applications automatically repair themselves.

application automatically installs (see the "Working with Different File Types" section of this paper). In addition, administrators can update the application-distribution point without no adverse affect on the users' ability to install the application.
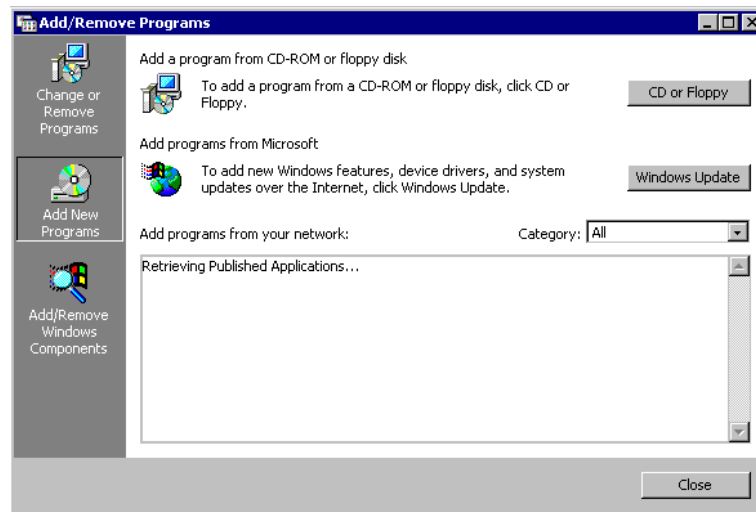

Figure 6. The enhanced Add/Remove Programs dialog box provides more information about applications, such as disk space used, version, frequency of use, and whether online technical support is available.

Working with Hardware

Windows 2000 Professional has been enhanced to run with more hardware, specifically by supporting Plug and Play, power management,[2] and the Universal Serial Bus (USB). USB is a type of bus that makes it easy to install different types of compatible peripherals, including keyboards, cameras, scanners, and other imaging devices. When they run on Windows 2000 Professional, Plug and Play and power management are significantly more reliable than their predecessor technologies because these functions are managed together by the operating system, rather than as separate components that are not truly integrated with the operating system.

The Add/Remove Hardware applet helps users troubleshoot hardware. When Windows 2000 detects new hardware, it checks the current settings for the device and installs the correct driver. The wizard also shows a list of installed hardware and helps the user check to be sure that each device is working properly.

Windows 2000 Professional also verifies that devices are signed, meaning that they are certified to work with Windows 2000 Professional, before it installs them.

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[2] Through a new technology called Advanced Configuration and Power Management (ACPI). For more information on ACPI, please refer to the Windows 2000 Professional Technical Overview paper, available on www.microsoft.com/windows.

Because the operating system performs this check, users need not worry about installing unauthorized or untested hardware that could compromise the reliability of a system. Microsoft signs all the drivers and files in the Windows 2000 Professional CD.

Reorganized Control Panel

The Windows 2000 Professional Control has been significantly reorganized to make it easier for users to perform regular maintenance tasks and to troubleshoot. These changes also protect users from making any changes that will cause their systems to not work properly.
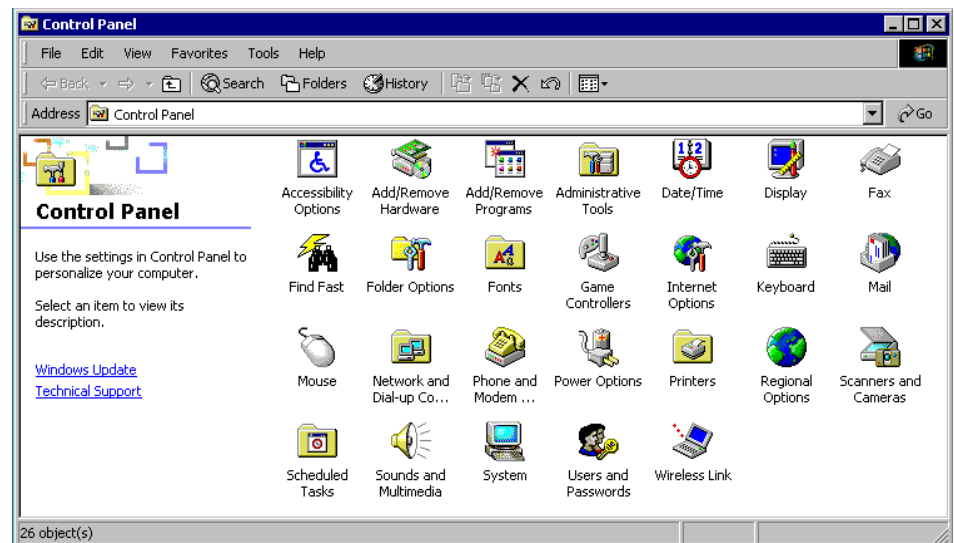

Figure 7. The Windows 2000 Professional Control Panel is organized to make it easier to perform regular maintenance tasks and to troubleshoot.

Some of the key refinements to the Control Panel include:

- **More logical organization**. For example, a user who is having problems with a modem can go directly to the **Modem** settings, select the **Hardware** tab, and choose **Troubleshoot**.
- **System**. Combines several applets to make it easier to configure settings: Network Identification, Hardware, User Profiles, and Advanced.
- **Users and Passwords**. This applet is used to add users and groups. If a non-administrative user wants to change this information, the applet allows the user to change this information without having to log off and then log on.
- **Folder Options**. Users can change the appearance of their computer's desktop and folder content. For example, a user can select whether they want a single window to open (instead of cascading windows) when they open folders. Users can also choose whether they want folders to open with a single click or double click.

- **Add/Remove Hardware**. This centralized wizard helps users add, remove, unplug, and troubleshoot hardware. When Windows 2000 Professional detects new hardware, it checks the current settings for the device and installs the correct driver. The wizard also shows a list of installed hardware and helps the user check to be sure that each device is working properly.
- **Administrative tools**. In the enhanced Control Panel, advanced tools are in the same dialog box. Generally speaking, these are tools that a helpdesk person or IT professional needs to access; the typical user does not need these tools in order to use their computer. These tools include:
    - **Component Services**. System administrators use this tool to deploy and administer COM+ programs from a graphical user interface, or to automate administrative tasks using a scripting or programming language.
    - **Computer Management**. Administrators use this tool to manage local or remote computers from a single, consolidated desktop utility. Computer Management combines several Windows 2000 administrative tools (System Tools, Storage, and Server Applications, and Services) into a single console tree, providing easy access to a specific computer's administrative properties.
    - **Data Source (ODBC)**. Connection Pooling allows an application to reuse open connection handles, which saves round trips to the server.
    - **Event Viewer**. This tool can export the event list log to a text file.

SUMMARY

Business desktop-computer users work most efficiently when they understand how to use their computers and operating systems. An efficiently used computer and operating system justifies its cost by helping its user to work more efficiently. The improvements introduced with Windows 2000 Professional make it the easiest-to-use Windows operating system. Microsoft recommends that organizations whose workers use desktop computers upgrade to Windows 2000 Professional.

FOR MORE INFORMATION

For the latest information on Microsoft Windows® 2000 Professional, check out our World Wide Web site at http://www.microsoft.com/windows/professional.

For the latest information on the Windows 2000 Beta 3, check out the World Wide Web site at http://ntbeta.microsoft.com.